DISCUSSION

Among the interesting features of the present case were the multiple symmetrically placed aneurysms of both carotid arteries that caused no severe distress until rupture of one into the left cavernous sinus brought about impairment of all the nerves supplying the left eye and severe overfilling of the left orbital venous system. The mechanism and sequence of involvement of the third through sixth cranial nerves in their course through the sinus by intracavernous aneurysms was described by Jefferson,[6] who emphasized that the oculomotor nerve is involved early by compression from the aneurysmal mass, and that anesthesia in the distribution of the trigeminal nerve accompanying ocular muscle palsy is a diagnostic combination most suggestive of a subclinoid aneurysm.

The complications following left carotid ligation in the present case were also of interest. In this patient, the collateral circulation to the left cerebral hemisphere was adequate as long as the blood pressure remained elevated; but when hypotension supervened, the combined action of pressor drugs and cerebral vasodilating agents was insufficient to provide adequate blood flow to the left hemisphere and symptoms of cerebral ischemia developed.

The arterial hypertension immediately following carotid ligation was probably a manifestation of carotid sinus pressor reflex activity, and presumably provided sufficient inflow from collateral channels to prevent left cerebral ischemia. The subsequent occurrence of arterial hypotension was accompanied by progressive and severe neurologic deterioration, which has been reported in other cases in which arterial hypotension occurred after carotid ligation.[4] It is most likely that the cause is a diminution in collateral inflow secondary to lowered arterial pressure, but what causes the hypotension is obscure.

Another possible factor in reduction of collateral inflow is vascular spasm, both general and local, the latter specifically in relation to the presence of aneurysms on the right carotid which could induce local arteriospasm as well as the potential distortion of normal flow by the physical mass of the aneurysm. Collapse of the internal carotid artery, noted on the third postoperative day, was apparently due in part to spasm of the collateral vessels rather than to thrombosis, particularly since angiographic visualization later showed patency of the left carotid vessels distal to the ligature.

Cerebral edema resulting from prolonged cerebral ischemia probably developed during the fourth postoperative day, leading to stupor and further progression of neurologic deficits, and causing even further diminution in the left cerebral inflow. The improvement noted in the second postoperative week was probably due to remission of cerebral edema, and the later continued improvement was probably owing to development of improved collateral channels to the left hemisphere.

SUMMARY

A case of bilateral symmetrical aneurysms of the subclinoid and supraclinoid portions of the internal carotid arteries is presented. The case was of particular interest because of the development of a spontaneous carotid-cavernous fistula on one side and the developments that followed ipsilateral common carotid ligation.

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Cavitary Carcinoma of the Lung

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IN 3 TO 4 PER CENT of all cases, carcinoma of the lung is visualized roentgenographically as a cavitary lesion. Operative therapy is frequently delayed unduly while an attempt is made to determine the cause of the lesions noted. Generally, the diagnostic procedures include microscopic examination of sputum, preparation of cultures and guinea pig inoculation as well as skin tests for coccidioidomycosis and histoplasmosis. We believe that thoracotomy should be carried out if necessary to resolve the diagnosis rather than permit undue delay entailed in more conservative methods. Strang[3] in a review of 1,930 cases of carcinoma of the lung noted that 3.6 per cent of them were seen in roentgen studies as

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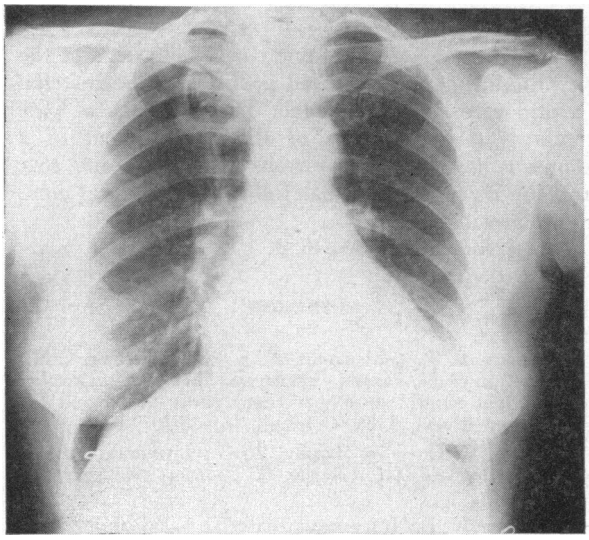

Figure 1 (Case 1).—Right apical cavitary lesion in February of 1954.

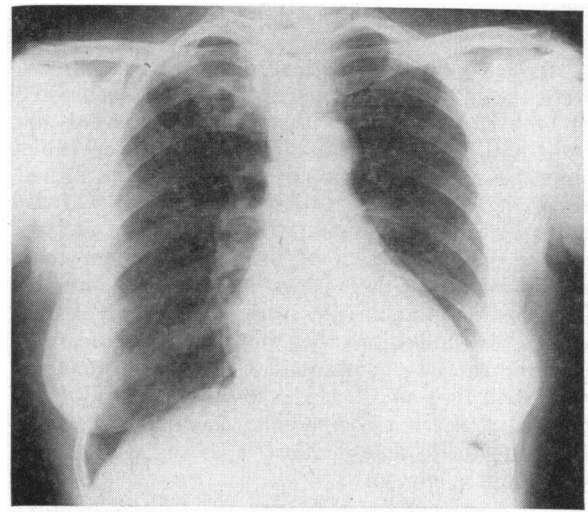

Figure 2 (Case 1).—Increase in size and extent of the cavity in June of 1954.

cavitary lesions. Brock[1] noted that bronchogenic carcinoma was the cause in 56 (13.8 per cent) of 405 cases of abscess of the lung. We report the following cases as illustrative of the problem.

CASE 1. A 57-year-old white woman was admitted to hospital in January of 1954 because of acute myocardial infarction. She was known to have had hypertension for the previous 12 years and had had a cerebral vascular accident in 1950 and myocardial infarction in 1951. She had been repeatedly admitted to the hospital because of acute episodes of angina, vomiting and dizziness. On previous admissions, results of laboratory studies were within normal limits, with hemoglobin content 14.5 gm. per 100 cc. of blood and the packed cell volume 46 per cent. At the present admission the hemoglobin was 10.6 gm. per 100 cc. and the packed cell volume 40 per cent. One sibling had died of tuberculosis.

Because of a persistent low-grade fever, x-ray films of the chest were taken repeatedly during the second week of hospitalization, and a cavity 2 cm. in diameter (Figure 1) was shown in the right apex. Repeated sputum examinations, guinea pig inoculations and studies of gastric aspirates were negative for tubercle bacilli. Results of skin tests with tuberculin, first and second strength, were negative. Bronchoscopic examination and thoracotomy were deemed hazardous because of the cardiac condition. It was felt that there was justification for antituberculosis therapy. The patient was discharged with instruction to report to the chest clinic for periodic examination. Radiographs taken in June and July of 1954 (Figure 2) showed enlargement of the cavity and formation of fluid. In July of 1954 the patient had another cerebral vascular accident and after a week in hospital was discharged. However, she was readmitted in coma seven days later and died in 24 hours.

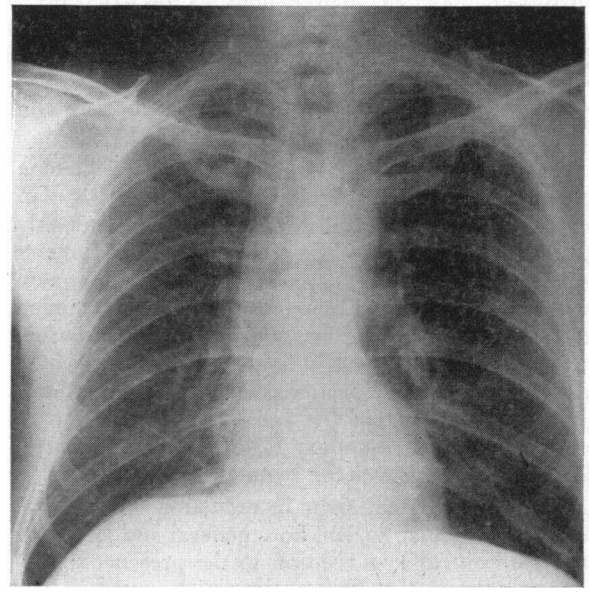

Figure 3 (Case 2).—Well demarcated cavity at the right apex.

At postmortem examination the cavity was observed to be due to a squamous cell bronchogenic carcinoma. There was cavitary degeneration within the tumor mass.

CASE 2. A 54-year-old white man was admitted March 6, 1956, for evaluation of a frozen shoulder joint. Routine minifilm examination had shown a right apical pulmonary lesion. In a full 14x17 film of the chest it was seen as a cavitary lesion of the right upper lobe (Figure 3). Microscopic examination of sputum, a serologic test for coccidioidomycosis, bronchoscopic examination, Papanicolaou cytologic studies and biopsy of a right supraclavicular lymph node all were negative for disease. Thoracotomy was done April 8, 1956. A frozen section showed carcinoma and right upper lobectomy was carried out.

The pathologist reported that the operative specimen contained infiltrating peripheral squamous cell carcinoma showing central necrosis with cavitation.

CASE 3. An 80-year-old white man was admitted March 3, 1956, because of hemoptysis. A cough of several years' duration had increased in severity two months before admittance, had become constant and was productive of yellow-green sputum. The day before admittance hemoptysis of about a cup of blood occurred. Multiple cavitary lesions were observed in a film of the chest (Figure 4). The roentgen appearance was quite atypical of carcinoma and highly suggestive of tuberculosis. The hemoglobin content was 9.5 gm. per 100 cc. of blood. Leukocytes numbered 12,000 per cu. mm., 82 per cent polymorphonuclear neutrophils. Results of urinalysis were within normal limits. The patient rapidly deteriorated and died March 11 after an episode of severe dyspnea and tachypnea.

Pathologist's report: The right lung weighed 1,000 gm. A cavity 6 cm. in diameter extended across the right upper and lower lobe fissure. The wall of the cavity was composed of firm tissue which showed squamous cell carcinoma throughout, and the cavity itself was an area of central degeneration within the tumor mass. The remaining infiltrative areas of the lung showed non-specific pneumonitis.

CASE 4. A 69-year-old white man was admitted April 30, 1956, for investigation of a cavitary lesion of the right upper lobe of the lung which was observed in a routine film of the chest (Figure 5). At the time of admission the patient was completely asymptomatic. He never had had hemoptysis. He had smoked ten to fifteen cigarettes a day for approximately 50 years. The past history included admission to hospital in February of 1955 because of severe angina. A film of the chest taken at that time revealed a 1.5 cm. density in the right upper lobe of the lung. Unfortunately, no investigative procedures with regard to this lesion were carried out.

At the time of admittance the hemoglobin was 15.2 gm. per 100 cc. of blood. Erythrocytes numbered 5.7 million per cu. mm. and leukocytes 5,000 —59 per cent filamentous forms and no non-filamentous forms. The temperature in the week following admittance varied from 37° C. to 37.4° C.

On May 1 bronchoscopy was done. The right upper lobe bronchus was visualized by use of the right-angle Broyle telescope and a polypoid tumor was seen projecting into the lumen of the bronchus. Biopsy of specimens excised from the right upper lobe orifice and the carina was negative for tumor. Right supraclavicular lymph node excision was done and no neoplasm was found on microscopic examination of the specimen.

In May exploratory thoracotomy was carried out and a non-resectable infiltrating carcinoma was found. The tumor involved the superior vena cava wall.

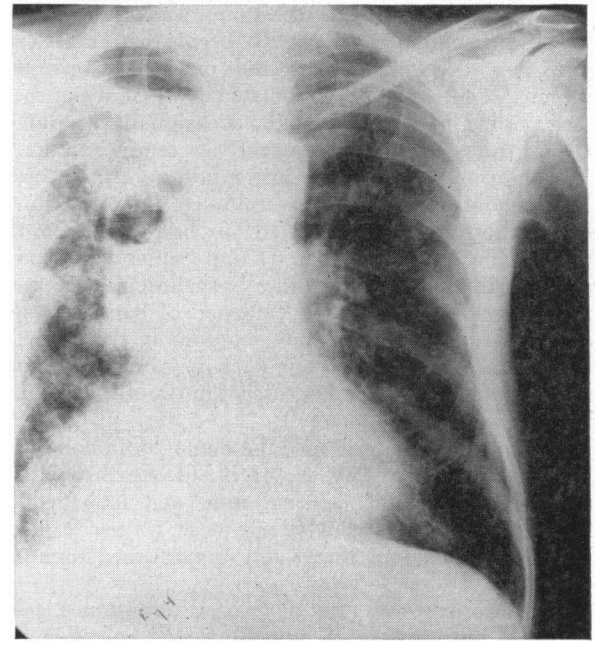

Figure 4 (Case 3).—Multiple cavitary lesions in the right upper lung field and non-specific infiltrate throughout the remainder of the lung.

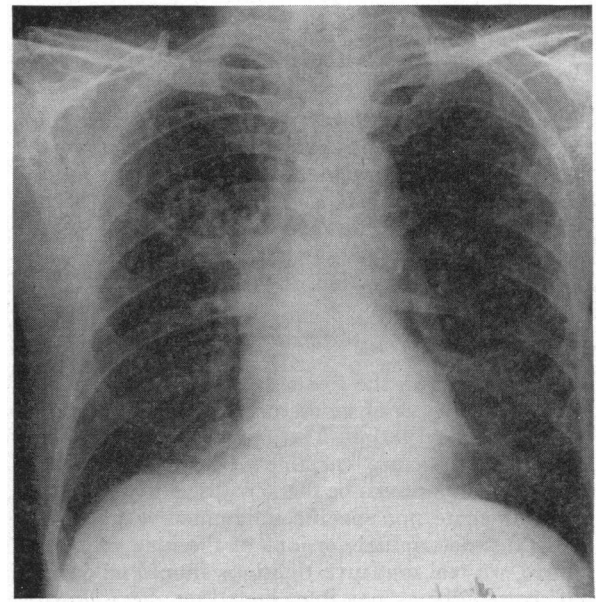

Figure 5 (Case 4).—A distinct cavity in the right upper lung field.

A diagnosis of cavitary tuberculosis was considered in this case until the observation of an endobronchial right upper lobe polypoid neoplasm at bronchoscopic examination indicated the need for early exploratory thoracotomy. The diagnosis of squamous cell carcinoma was made from tissue removed from the lateral wall of the cavity. Thus the cavity was caused by a degenerative breakdown within a tumor mass.

CASE 5. A 54-year-old white man was admitted to hospital September 13, 1956, because of malaise and loss of weight over the preceding several months. There was no associated pain or dyspnea. The patient had had a cough, occasionally productive of traces of blood but largely of creamy sputum. No abnormality was noted in a minifilm of the chest taken about a year before admittance. An x-ray film of the chest taken August 27, 1956, had shown a left upper lobe cavity (Figure 6). On September 1 no abnormality was observed in a bronchoscopic examination and there was no evidence of cancer in a supraclavicular lymph node excised at that time. The patient had smoked one package of cigarettes a day for 40 years. Broad spectrum antibiotic therapy had been begun September 1.

At the time of admittance the hemoglobin content was 16.0 gm. per 100 cc. of blood. Erythrocytes numbered 5 million per cu. mm. and leukocytes 9,500 with 47 per cent filamentous forms, 2 per cent non-filamentous forms and 41 per cent lymphocytes.

Left thoracotomy the day after admittance revealed a non-resectable squamous cell carcinoma, proven by frozen section biopsy. One wall of the tumor cavity was made up by the aortic arch.

In this case bronchoscopy and lymph node excision were done before the patient was admitted to hospital. A number of specimens of sputum were examined for acid-fast organisms before admission and in a period of two weeks before admittance, while the patient was receiving broad spectrum antibiotic therapy, repeated x-ray films of the chest showed no significant change in the infiltrate in the left upper lobe. Thoracotomy was done immediately, therefore, to establish a diagnosis and to permit whatever excisional therapy was feasible. Biopsy of material from the lateral cavitary wall indicated the cavity was an excavation of the tumor mass.

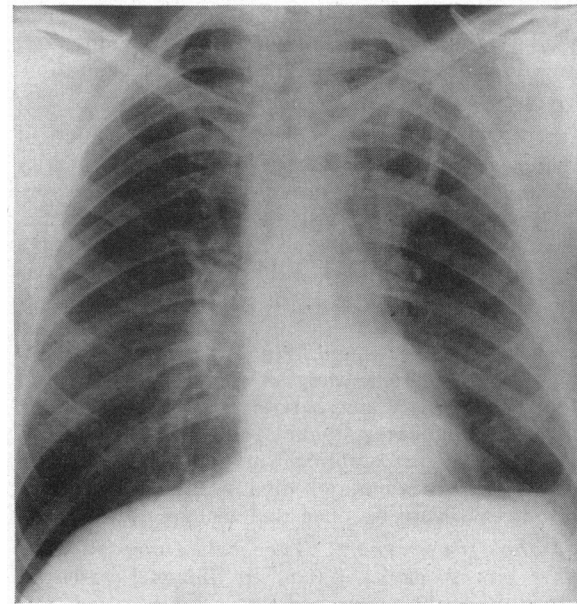

Figure 6 (Case 5).—A shaggy cavity with infiltrate around it in the left upper lung field.

DISCUSSION

The patients in the five cases herein had cavitary lesions of the lung of indeterminate cause at the time of initial examination. The clinical course and the laboratory data are variable in such cases. There may be no symptoms or the symptoms may simulate those of acute non-specific inflammatory processes. As with indeterminate lesions of the lung of a solid nature, we feel that investigations should be carried out as rapidly as possible, including the following procedures: Examination of the sputum by smear, culture and Papanicolaou methods, bronchoscopy and biopsy where indicated, excision of the regional supraclavicular lymph nodes for microscopic examination and also for cytologic specimens and culture of the lymph nodes if specific tuberculous or granulomatous fungus lesions are suspected. In addition, we feel that the administration of a broad spectrum anti-biotic in high dosage should be undertaken as a therapeutic test even though there be no definite evidence of systemic sepsis. We feel that the investigation period may be prolonged if truly significant change is demonstrated radiologically following administration of the anti-biotic therapy, that in the absence of such a change exploratory thoracotomy should be carried out promptly. Furthermore, we do not feel that exploratory thoracotomy should be delayed to wait for the results of cultures and guinea pig inoculations. We do, however, carry out repeated early examinations of the sputum for acid-fast organisms.

All the lesions in the cases here reported were squamous cell carcinomas. Other investigators have noted that cavitary carcinomatous lesions of the lung generally are of that type. Cavitation in carcinoma of the lung may result from either central degenerative changes within tumor tissue and excavation of the central area or, less frequently, from a purely pyogenic destruction of lung secondary to the obstructive phenomena of an endobronchial neoplasm.

Unfortunately, cavitary carcinomatous lesions generally are not observed until a late stage in the disease, and prognosis is relatively poor.[3] Autopsy records in cases of death due to squamous cell bronchogenic carcinoma indicate an incidence of 12 per cent to 29 per cent of cavitation within tumor masses.[2] Other cell types cause death more rapidly, and less frequently show cavitation.[3]

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